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Chemical reactions take time, and this is especially true when the quantities of materials that react are small and the temperatures low, and when the chemical reason for the reaction, so to speak, is only moderately strong.

In a coagulating basin that is too small, a reaction that will ultimately take place may have only partly taken place when the water leaves it for the filter. When this happens the water goes through the filter in an unstable condition, with the probability that the reaction will be completed in the pure water reservoir and in the mains, with the production of sludge deposits which are flushed forward at intervals, to the great annoyance of takers.

Waters containing lime, to the extent that they react with phenolphthalein, are likely to cause troublesome deposits of calcium carbonate. The author speaks of such a degree of alkalinity in treated water in some cases. The question may be raised as to whether it is not essential to ultimate success that such water should be recarbonated, or at least treated by a supplementary process that will remove this condition and make it so stable that calcium carbonate is incapable of separating from it.

Allen Hazen.

THE IMPORTANCE OF COMPLETE INVESTIGATION WORK IN DETERMINING THE SAFETY OF WATER SUPPLIES FOR HUMAN CONSUMPTION

The importance of thorough investigation work in determining the safety of a given water supply for human consumption is now generally recognized by health authorities, but the significance to be placed on the various features involved in an investigation is still the subject of discussion. This disagreement, which largely concerns detail methods and their application, is to be expected, for the problem of determining the safety of a wide range of water supplies, or even the same source of supplies under varying conditions, is somewhat complex. There are certain fundamental principles, generally recognized by sanitary engineers, that can be applied and make it possible to give quite a definite opinion on the safety of a water supply. These principles recognize the fact that satisfactory investigation work on existing water supplies must include thorough field and analytical investigation before a safe opinion can be given. They further recognize that the individual undertaking the investigation must be properly trained to detect sanitary defects in the location, construction and operation of the supply, to collect representative samples for analysis, to understand the principles involved in analytical work, to interpret analytical results properly with due consideration of the information obtained during the field survey, and finally to make recommendations for correcting existing defects or, if necessary, for the abandonment of unsatisfactory supplies.

In order to show the importance of the two fundamental parts of a water supply investigation, the field survey and the analytical results, a summary of six years' investigation work on existing water supplies by the Minnesota State Board of Health is given in tables 1 and 2. These investigations were made by representatives of the State Board of Health and each investigation included a thorough field survey and analytical examinations of the water. The supplies were not classified as safe unless their location, construction and operation were found to be satisfactory and the analytical results were shown to conform with the standards required for domestic water supplies in this State. It should be stated that the interpretation of analytical results was made with full knowledge of the field survey, which sometimes provided information that would alter an arbitrary interpretation of these results.

TABLE 1

Water supply investigations, 1912–1918

	WATER SUPPLIES INVESTIGATED	SATISFACTORY	UNSATISFACTORY
Number	1119	389	730
Per cent	100	34	66

The investigations recorded in Table I represent both surface and underground water supplies from a variety of sources, including wells (dug, bored, drilled, driven), springs, lakes, rivers, creeks, etc.

Table 2 shows that the field survey was corroborated by the analytical results in 49 per cent of the cases; that the field survey was the only index of danger in 46 per cent; and the analytical results the only indication in 5 per cent. These results demonstrate the importance of thorough field survey work, for had the analytical results been accepted as the only index, 46 per cent of the unsatisfactory supplies would have been approved. It is also true that if the analytical work had been omitted, 5 per cent of the unsatisfactory supplies would have been overlooked.

It is evident from these results that both the field survey and analytical results are necessary in order to determine the safety of an existing water supply for human consumption.

The field survey should give an accurate idea of the possibilities of present and future pollution. The analytical results should provide information on the sanitary condition of the water at the particular time the investigation is made and possibly some information of its past history. The field survey and analytical results combined should provide data for an opinion on the safety of the supply in its existing condition and afford information on which recommendations can be made for the correction of defects or for the abandonment of an unsafe supply.

TABLE 2

Unsatisfactory water supplies, 1912–1918

	UNSATISFACTORY WATER SUPPLIES	SHOWN UNSATISFACTORY BY		
		Field survey and analytical results	Field survey	Analytical results
Number.............	730	354	338	38
Per cent	100	49	46	5

The purpose of this Comment is to emphasize the importance of complete investigation work by thoroughly trained individuals when the safety of an existing water supply is to be determined. The use of haphazard methods by unskilled individuals leads to erroneous opinions which may result in loss of life among the consumers of the water supply. H. A. WHITTAKER.

MINNESOTA'S TYPHOID FEVER RECORD

In connection with Mr. Whittaker's comments on the value of complete investigations of the safety of water supplies, attention is called to what the work of this sort by the Minnesota State Board of Health has accomplished. The data were recently given in *Journal of the Minnesota Public Health Association*, which states that in 1910 the State Board began a pure water supply campaign. The legislature appropriated $5000 for the work in 1911 and $7500 for the 1912 sanitary engineering work. The next year the appropriation was cut to $7000, at which figure it has since continued. In 1914 the Board's engineering and laboratory divisions were combined to make the present division of sanitation, which has charge of all work on water supply and sewerage systems. What it has